PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark Office, PCT
2011 South Clark Place Room CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing: 08 March 2001 (08.03.01)	
International application No.: PCT/KR99/00505	Applicant's or agent's file reference: YPPC9101
International filing date: 02 September 1999 (02.09.99)	Priority date:
Applicant: JUNG, Duk, Jin	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International preliminary Examining Authority on:

26 June 2000 (26.06.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer:

J. Zahra

Telephone No.: (41-22) 338.83.38

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference *(if desired) (12 characters maximum)* YPPC9101

Box No. I TITLE OF INVENTION

A DEVICE FOR RECORDING IMAGE OF DRIVING CIRCUMSTANCES AROUND AUTOMOBILE

Box No. II APPLICANT

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

LEE, Eung Do
351-20 Kayang-1-dong, Dong-gu
Taejeon 300-091, Republic of Korea

☐ This person is also inventor.

Telephone No. 82-42-485-2320

Facsimile No. 82-42-485-0645

Teleprinter No.

State *(that is, country)* of nationality: KR

State *(that is, country)* of residence: KR

This person is applicant for the purposes of: ☐ all designated States ☑ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

JUNG, Duk Jin
116-803 Woosung Apartment, junglim-dong
Seo-gu, Taejeon 302-230, Republic of Korea

This person is:

☐ applicant only

☑ applicant and inventor

☐ inventor only *(if this check-box is marked, do not fill in below)*

State *(that is, country)* of nationality: KR

State *(that is, country)* of residence: KR

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☑ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☑ agent ☐ common representative

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

Yu, Byung Surn
610 Mannyun Officetel, 241 Walpyung-dong,
Seo-gu, Taejeon 302-282, Republic of Korea

Telephone No. 82-42-485-2711

Facsimile No. 82-42-485-2718

Teleprinter No.

☐ **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) *(mark the applicable check-boxes; at least one must be marked)*:

Regional Patent

- ☐ AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☐ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☑ EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☐ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT *(if other kind of protection or treatment desired, specify on dotted line)*

National Patent *(if other kind of protection or treatment desired, specify on dotted line)*:

- ☐ AE United Arab Emirates
- ☐ AL Albania
- ☐ AM Armenia
- ☐ AT Austria
- ☑ AU Australia
- ☐ AZ Azerbaijan
- ☐ BA Bosnia and Herzegovina
- ☐ BB Barbados
- ☐ BG Bulgaria
- ☐ BR Brazil
- ☐ BY Belarus
- ☑ CA Canada
- ☐ CH and LI Switzerland and Liechtenstein
- ☑ CN China
- ☐ CU Cuba
- ☐ CZ Czech Republic
- ☐ DE Germany
- ☐ DK Denmark
- ☐ EE Estonia
- ☐ ES Spain
- ☐ FI Finland
- ☐ GB United Kingdom
- ☐ GD Grenada
- ☐ GE Georgia
- ☐ GH Ghana
- ☐ GM Gambia
- ☐ HR Croatia
- ☐ HU Hungary
- ☐ ID Indonesia
- ☐ IL Israel
- ☑ IN India
- ☐ IS Iceland
- ☑ JP Japan
- ☐ KE Kenya
- ☐ KG Kyrgyzstan
- ☐ KP Democratic People's Republic of Korea
- ☑ KR Republic of Korea
- ☐ KZ Kazakhstan
- ☐ LC Saint Lucia
- ☐ LK Sri Lanka
- ☐ LR Liberia
- ☐ LS Lesotho
- ☐ LT Lithuania
- ☐ LU Luxembourg
- ☐ LV Latvia
- ☐ MD Republic of Moldova
- ☐ MG Madagascar
- ☐ MK The former Yugoslav Republic of Macedonia
- ☐ MN Mongolia
- ☐ MW Malawi
- ☐ MX Mexico
- ☐ NO Norway
- ☐ NZ New Zealand
- ☐ PL Poland
- ☐ PT Portugal
- ☐ RO Romania
- ☐ RU Russian Federation
- ☐ SD Sudan
- ☐ SE Sweden
- ☐ SG Singapore
- ☐ SI Slovenia
- ☐ SK Slovakia
- ☐ SL Sierra Leone
- ☐ TJ Tajikistan
- ☐ TM Turkmenistan
- ☐ TR Turkey
- ☐ TT Trinidad and Tobago
- ☐ UA Ukraine
- ☐ UG Uganda
- ☑ US United States of America
- ☐ UZ Uzbekistan
- ☐ VN Viet Nam
- ☐ YU Yugoslavia
- ☐ ZA South Africa
- ☐ ZW Zimbabwe

Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet:

- ☐
- ☐

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. *(Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)*

Box No. VI PRIORITY CLA[illegible] ☐ Further priority cla[illegible]re indicated in the Supplemental Box.

Filing date of earlier application (day month year)	Number of earlier application	Where earlier application is: national application: country	regional application:* regional Office	international application: receiving Office
item (1)				
item (2)				
item (3)				

☐ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) *(only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office)* identified above as item(s).

* *Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.*

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) *(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used)*

ISA/ AT

Request to use results of earlier search; reference to that search *(if an earlier search has been carried out by or requested from the International Searching Authority)*:

Date *(day month year)* Number Country *(or regional Office)*

Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following number of sheets:

request	3
description (excluding sequence listing part)	19
claims	3
abstract	1
drawings	3
sequence listing part of description	
Total number of sheets	29

This international application is accompanied by the item(s) marked below:

1. ☐ fee calculation sheet
2. ☑ separate signed power of attorney
3. ☐ copy of general power of attorney; reference number, if any:
4. ☐ statement explaining lack of signature
5. ☐ priority document(s) identified in Box No. VI as item(s):
6. ☐ translation of international application into (language):
7. ☐ separate indications concerning deposited microorganism or other biological material
8. ☐ nucleotide and or amino acid sequence listing in computer readable form
9. ☐ other *(specify)*:

Figure of the drawings which should accompany the abstract: 2

Language of filing of the international application: English

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

Yu, Byung Surn

For receiving Office use only

1. Date of actual receipt of the purported international application:	2. Drawings: ☐ received: ☐ not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:	
4. Date of timely receipt of the required corrections under PCT Article 11(2):	
5. International Searching Authority (if two or more are competent): ISA/	6. ☐ Transmittal of search copy delayed until search fee is paid.

For International Bureau use only

Date of receipt of the record copy by the International Bureau:

10/070,162

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
YPPC9101		
International application No.	International filing date (*day/month/year*)	Priority Date (*day/month/year*)
PCT/KR 99/00505	2 September 1999 (02.09.1999)	
International Patent Classification (IPC) or national classification and IPC		
IPC[7]: B60R 1/00		
Applicant		
LEE, Eung Do et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examination Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

   - I. ☒ Basis of the opinion
   - II. ☐ Priority
   - III. ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV. ☐ Lack of unity of invention
   - V. ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI. ☐ Certain documents cited
   - VII. ☐ Certain defects in the international application
   - VIII. ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
26.06.2000	28 November 2001 (28.11.2001)
Name and mailing address of the IPEA/AT Austrian Patent Office Kohlmarkt 8-10 A-1014 Vienna Facsimile No. 1/53424/200	Authorized officer PANGRATZ Telephone No. 1/53424/413

Form PCT/IPEA/409 (cover sheet) (July 1998)

corrected version

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/KR 99/00505

I. Basis of the report.

1. With regard to the **elements** of the international application:*

☒ the international application as originally filed

☐ the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____.

☐ the claims:
pages _____, as originally filed
pages _____, as amended (together with any statement) under Article 19
pages _____, filed with the demand
pages _____, filed with the letter of _____.

☐ the drawings:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____.

☐ the sequence listing part of the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____.

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in printed form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____.

☐ the claims, Nos. _____.

☐ the drawings, sheets/fig _____.

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-7	YES
	Claims		NO
Inventive step (IS)	Claims	1-7	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-7	YES
	Claims		NO

Citations and explanations (Rule 70.7)

The following documents have been cited in the Search Report:

D1: US 5475494 A
D2: GB 2224358 A
D3: EP 0921375 A1
D4: DE 19700793 A1

Document D1 discloses a driving environment surveillance apparatus.comprising a forward looking camera combined with an obstacle detecting unit. The outputs of both units undergo several evaluation processes with the goal of avoiding head-on collisions.

Document D2 shows a vehicle security camera located in the roof of a vehicle and generating a complete enviromental image by using several fish-eye lenses. Images are taken either by automatically triggering or initiated by an occupant.

Document 3 discloses an image recording apparatus for recording images sensed by at least two cameras attached to a vehicle with the purpose of generating a panoramic picture in which a viewer may walk.

Document 4 shows an apparatus for watching the following traffic for detecting situations in which a rear end collision may occur.

None of the cited documents, neither alone nor combined, discloses a device for recording an image of driving circumstances around a car, comprising several cameras obtaining in real time the driving circumstances around the car, whereby the obtained informations are processed for recording and reproducing and finally are stored in real time by image recording means.

Therefore the device claimed in the application is considered to be new and inventive.

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Box V (page 1)

Industrial applicability is given.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
YPPC9101		
International application No.	International filing date (*day/month/year*)	(Earliest) Priority Date (*day/month/year*)
PCT/KR 99/00505	2 September 1999 (02.09.1999)	
Applicant		
LEE, Eung Do et al.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
      ☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:
      ☐ contained in the international application in written form.
      ☐ filed together with the international application in computer readable form.
      ☐ furnished subsequently to this Authority in written form.
      ☐ furnished subsequently to this Authority in computer readable form.
      ☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
      ☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.
2. ☐ **Certain claims were found unsearchable** (See Box I).
3. ☐ **Unity of invention is lacking** (See Box II).
4. With regard to the **title**,
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract**,
   ☐ the text is approved as submitted by the applicant.
   ☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. The figure of the **drawings** to be published with the abstract is Figure No.: 2
   ☒ as suggested by the applicant. ☐ None of the figures.
   ☐ because the applicant failed to suggest a figure.
   ☐ because this figure better characterizes the invention.

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/KR 99/00505

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

Disclosed is a device for recording an image of driving circumstances around an automobile (100), the device comprising: a plurality of cameras (101,102) mounted to the automobile (100) for obtaining in real time the driving circumstances around the automobile (100) as image information; an image signal processing section (103) for processing the image information obtained by the plurality of cameras (101,102) to a format which is suitable for recording and reproducing; and an image recording section (105) for storing in real time the image signals processed by the image signal processing section (103).

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
8 March 2001 (08.03.2001)

PCT

(10) International Publication Number
WO 01/15936 A1

(51) International Patent Classification[7]: B60R 1/00

(21) International Application Number: PCT/KR99/00505

(22) International Filing Date:
2 September 1999 (02.09.1999)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant *(for all designated States except US)*: **LEE, Eung, Do** [KR/KR]; 351-20 Kayang-1-dong, Dong-gu, Taejeon 300-091 (KR).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **JUNG, Duk, Jin** [KR/KR]; 116-803 Woosung Apartment, Junglim-dong, Seo-gu, Taejeon 302-230 (KR).

(74) Agent: **YU, Byung, Surn**; 610 Mannyun Officetel, 241 Walpyung-dong, Seo-gu, Taejeon 302-282 (KR).

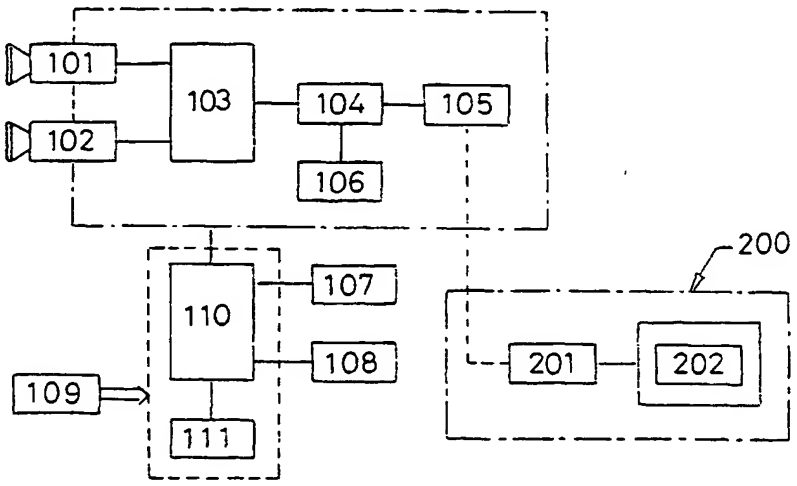
(81) Designated States *(national)*: AU, CA, CN, IN, JP, KR, US.

(84) Designated States *(regional)*: European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published:
— *With international search report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: A DEVICE FOR RECORDING IMAGE OF DRIVING CIRCUMSTANCES AROUND AUTOMOBILE



(57) Abstract: Disclosed is a device for recording an image of driving circumstances around an automobile (100), the device comprising: a plurality of cameras (101, 102) mounted to the automobile (100) for obtaining in real time the driving circumstances around the automobile (100) as image information; an image signal processing section (103) for processing the image information obtained by the plurality of cameras (101, 102) to a format which is suitable for recording and reproducing; and an image recording section (105) for storing in real time the image signals processed by the image signal processing section (103).

WO 01/15936 A1

A DEVICE FOR RECORDING IMAGE OF DRIVING CIRCUMSTANCES AROUND AUTOMOBILE

Technical Field

The present invention relates to a device mounted to an automobile for automatically recording circumstances around the automobile as images with sounds, and more particularly, the present invention relates to a device for recording an image of driving circumstances around an automobile, wherein cameras for obtaining images are mounted to the automobile, image information obtained by the cameras is converted into digital signals and then stored to a recording medium, and the recorded image information can be decoded to be displayed on a monitor or the recording medium can be disconnected from the device to allow images to be reproduced using a separate image reproducing unit.

Background Art

Generally, when an automobile is running, stopped or parked, driving circumstances around one's own automobile is unpredictably changed. If an accident occurs among one's own automobile, another automobile and walkers while the automobiles are running, it is necessary

to secure a convincing evidence having objectivity which is to be used for judging a fault among the parties concerned, and this is considered as a very important factor not only to a driver oneself, but also to a driver of another automobile and walkers.

However, in actual fact, it is very difficult to secure a convincing evidence having objectivity for a situation of an accident, which occurs when one's own automobile is running, stopped or parked. At the most, judgement of a fault among parties concerned is made mainly on the basis of assertions of the concerned parties, a record of the accident written by a traffic policeman, photographs taken after the accident occurs, etc. Moreover, actually, it is difficult to secure a witness and convincing verbal evidence from the witness.

Also, while wicked actions which cause damages such as puncture of a tire or scratch on a body, to automobiles are substantially being done, when an offending automobile or an offender fled, even if it is possible to catch the offending automobile or seize the offender on a later day, because it is difficult to secure a concrete evidence, it is impossible to receive lawful compensation.

On the other hand, as means for considering driving circumstances of an automobile and obtaining information

related to the driving circumstances of the automobile, a tachograph is disclosed in the art.

However, because information such as speed of one's own automobile, angle of a steering wheel, running time of the automobile, etc. at the time when an accident occurs, is recorded to the tachograph, information for a minor collision, an accident at a pedestrian crossing, a signal violation, a knock down and run away accident, etc. which may occur while driving the automobile in complex and various road driving circumstances, cannot be properly provided.

On the other hand, a device in which a sensor is installed rearward of an automobile for overcoming a problem due to blind areas so that an alarm is rendered when the sensor senses a human body or an obstacle positioned rearward of the automobile, a device in which a camera capable of imaging blind areas of an automobile is installed to a proper position so that images for the blind areas obtained by the camera are displayed on a monitor located in the vicinity of a driver seat, etc. are disclosed in the art. However, the devices simply function as auxiliary means used in driving an automobile, and it is impossible for the devices to record and reproduce driving circumstances around the automobile to and from a recording medium as image information.

Disclosure of Invention

According to one aspect of the present invention, there is provided a device for recording an image of driving circumstances around an automobile, wherein small-sized cameras are mounted to the automobile for obtaining image information for the front side and the rear side of the automobile as monochrome or color image information, the image information obtained by the cameras is recorded in real time to a recording medium after being converted to digital signals , and the recorded image signals are capable of being reproduced to be displayed on displaying means.

According to another aspect of the present invention, there is provided a device for recording an image of driving circumstances around an automobile, wherein cameras are mounted to center portions of front and rear windshield glasses of the automobile for obtaining image information for the front side and the rear side of the automobile, the image information obtained by the cameras is recorded as capture images in real time and with a predetermined time interval to a recording medium after being converted to digital signals, and the recorded image signals are capable of being reproduced to be displayed on displaying means.

According to still another aspect of the present invention, there is provided a device for recording an image of driving circumstances around an automobile, wherein cameras for obtaining image information for the front side and the rear side of the automobile and means for sensing impact applied from the outside are mounted to the automobile; auxiliary power supply means supplements a battery power supply of the automobile itself while being automatically switched; when impact is applied to the automobile from the outside and damage is caused in a power supplying path of the automobile itself, a power source is automatically switched from the battery power supply to the auxiliary power supply means, and at the same time, images obtained by the cameras are converted into digital signals to be continuously recorded for a predetermined time in real time to a recording medium; and the recorded image signals are capable of being reproduced to be displayed on a display.

According to yet still another aspect of the present invention, there is provided a device for recording an image of driving circumstances around an automobile, wherein sound information is obtained, simultaneously with an image recording, by microphones installed inside and outside the automobile, whereby it is possible to record and reproduce a situation of an

accident occurring during running, parking or stopping, in a more realistic manner together with images.

Brief Description of Drawings

The above objects, and other features and advantages of the present invention will become more apparent after a reading of the following detailed description when taken in conjunction with the drawings, in which:

FIGs. 1A and 1B are plan views illustrating installation positions of cameras when a device for recording an image of driving circumstances is mounted to an automobile, wherein FIG. 1A depicts a state in which a pair of cameras are installed to be opposed to each other and FIG. 1B depicts another state in which a pair of cameras are installed to face each other;

FIG. 2 is a block diagram of the device for recording an image of driving circumstances around an automobile; and

FIG. 3 is a flow chart for explaining recording/reproducing procedures of an image of driving circumstances around an automobile, which are implemented in accordance with the present invention.

Best Mode for Carrying Out the Invention

Reference will now be made in greater detail to a preferred embodiment of the invention, an example of which is illustrated in the accompanying drawings. Wherever possible, the same reference numerals will be used throughout the drawings and the description to refer to the same or like parts.

Hereinafter, a construction and working effects of a device for recording an image of driving circumstances around an automobile in accordance with an embodiment of the present invention will be described in detail with reference to FIGs. 1A through 3.

FIG. 1A is a plan view illustrating installation positions of cameras in an automobile to which a device for recording an image of driving circumstances around an automobile of the present invention is mounted.

A front first camera 101 is directed toward the front of an automobile 100 and is attached to an inner upper end of a front windshield glass. An angle a1 through which the first camera 101 can image driving circumstances around the automobile can be properly enlarged using a wide-angle lens, a fisheye lens, etc. Image information for a front portion and front left and right portions of the automobile 100 is obtained by the front first camera 101.

A rear second camera 102 is directed toward the rear of the automobile 100 and is attached to an inner upper end of a rear windshield glass. An angle a2 through which the second camera 102 can image driving circumstances around the automobile can be properly enlarged using a wide-angle lens, a fisheye lens, etc. Image information for a rear portion and rear left and right portions of the automobile 100 is obtained by the rear second camera 102.

Small-sized charge-coupled devices (CCDs) can be used as the cameras, and, if desired, separate cameras can be additionally installed for left and right side portions of the automobile 100.

Also, according to the present invention, cameras having microphones provided therein can be installed, whereby images and sounds around the automobile 100 can be simultaneously obtained. In addition, other microphones can be installed inside the automobile 100, whereby, when an accident occurs, a situation inside the automobile 100 can be recorded as sounds together with images. Since a procedure for applying a technique of obtaining, recording and reproducing sound information to the present invention as described above, can be embodied by persons skilled in the art in a sufficient and easy manner, detailed descriptions for the procedure will be omitted.

On the other hand, as shown in FIG. 1B, the first camera 101 can be installed such that it is directed from the front toward the rear of the automobile 100, and the second camera 102 can be installed such that it is directed from the rear toward the front of the automobile 100. In other words, by installing the first and second cameras 101 and 102 such that their imaging angles are crossed with each other at points which are separated from a body of the automobile 100 by a distance d, operating ranges of the cameras 101 and 102 can be preferably enlarged. In this case, the cameras 101 and 102 can operate such that they securely remove blind areas at the left and right side portions of the automobile 100.

FIG. 2 shows a block diagram of the device for recording an image of driving circumstances around an automobile according to the present invention, the device including an image reproducing device 200.

As shown in FIG. 2, the device of the present invention includes the first and second cameras 101 and 102 which are mounted to the automobile 100 in proper directions for obtaining image information around the automobile 100, a screen-two-divisional processing section 103 for two-divisionally and simultaneously recording and reproducing image information obtained by the first and second cameras 101 and 102 on a screen, an encoder section

104 for processing the image information outputted from the screen-two-divisional processing section 103 to image signals having a suitable format and for converting the image signals to digital signals, an image recording medium 105 for storing the digital image signals converted by the encoder section 104, a recording time interval establishing section 106 for establishing a recording time interval of the image signals which are recorded to the image recording medium 105, a main power supply section 107 of the automobile 100 itself and an auxiliary power supply section 108, an impact sensor section 109 for sensing physical impact applied to the automobile 100, a power source switching section 110 for supplying power from the main power supply section 107 of the automobile 100 itself in an ordinary time and for supplying power from the auxiliary power supply section 108 when impact is sensed by the impact sensor section 109, and a forced-driving time establishing section 111 for establishing a power supplying time by the power source switching section 110 thereby establishing a time during which the image recording device is forcibly operated when impact is sensed by the impact sensor section 109.

Further, as described above, the device according to the present invention includes the image reproducing device 200. The image reproducing device 200 has a

decoder section 201 for reproducing the digital image signals which are recorded to the image recording medium 105 and a display section 202 for displaying on a monitor the image signals which are reproduced by the decoder section 201.

Due to the fact that the image reproducing device 200 is constructed together with the image recording device, it is possible to immediately reproduce recorded images and to display the reproduced image signals on the monitor. However, it is also possible to provide the image reproducing device 200 as a separate element and to implement only an image recording operation.

On the other hand, the image recording medium 105 as being a medium which can store digital image signals is constituted by a large scale hard disk drive (HDD), a flash memory, a re-writable CD-ROM, etc. Further, the image recording medium 105 can be realized such that it can be connected to and disconnected from the image recording device via a component such as a connector, a communication port or the like.

In addition, the image recording medium 105 can be constituted by a VCR. In this case, an analog/digital conversion processing by the encoder section 104 is not required, and recorded signals can be reproduced using a conventional analog VCR as it is.

Hereinafter, operations of the device for recording an image of driving circumstances around an automobile according to the present invention, constructed as mentioned above, will be described in detail with reference tc the block diagram of FIG. 2 and the flowchart of FIG. 3.

In an ordinary time, the power source switching section 110 supplies power for operating the device from the main power supply section 107 of the automobile 100 itself. The main power supply section 107 is a battery of the automobile 100 itself.

If the power is supplied to the device, operations of the first and second cameras 101 and 102 are initiated at step 301. Then, at step 302, images of the front and rear portions and side portions of the automobile 100, which are obtained by the first and second cameras 101 and 102, are processed on the left and right or upper and lower two-divisional screen by the screen-two-divisional processing section 103, and the processed image signals are converted into digital signals by the encoder section 104.

The screen-two-divisional processing as described above is implemented so that the images obtained by the first and second cameras 101 and 102 are simultaneously monitored on one screen.

The first and second cameras 101 and 102 can be constituted by CCDs which can obtain monochrome or color images. In case that color images are obtained, information for a type and a color of an offending automobile and facial features and clothes of an offender can be precisely secured.

If desired, separate cameras can be additionally installed for obtaining images for left and right side portions of the automobile 100. For example, in the case that four cameras are used, a screen-four-divisional processing in which four camera images are simultaneously displayed on one screen, is implemented.

The encoder section 104 functions not only to convert the obtained image signals to digital signals, but also to process (encode) the obtained image signals to have a proper signal format. For example, the encoder section 104 constructs digital image signals having a signal format which corresponds to NTSC standards.

The digital image signals are recorded to the image recording medium 105.

At this time, at step 303, a judgment for determining whether or not impact is sensed by the impact sensor section 109 is performed. Impact sensors are installed at proper positions along a lengthwise direction and/or a widthwise direction of the automobile 100, to

output a corresponding impact sensing signal when a minor collision or a crash occurs.

In the case that impact is applied to the automobile from the outside, power supply from the main power supply section 107 of the automobile 100 which is the battery of the automobile 100 itself, to the device, can be cut. Therefore, in this case, as in step 304, a power source switching operation is implemented by the power source switching section 110, whereby power is supplied from the auxiliary power supply section 108 to the device.

At this time, as in step 305, power is continuously supplied to the device from the auxiliary power supply section 108 for a forced-driving time, for example, for 15 minutes, which is established by the forced-driving time establishing section 111, whereby it is possible to obtain/record image information for driving circumstances around the automobile 100, not only immediately before a minor collision or a crash occurs, but also for a predetermined time after the minor collision or the crash occurs.

Then, at step 306, a judgement for determining whether or not a recording time interval is to be adjusted, is performed. If it is determined at step 306 that a recording time interval is to be adjusted, a

program proceeds to step 307 where a recording time interval is adjusted and established by the recording time interval establishing section 106, and thereafter, at step 308, an image recording operation is implemented for the established recording time interval.

For example, while the automobile 100 is running, the image recording operation is continuously implemented, and while the automobile 100 is being parked or stopped, images for the driving circumstances around the automobile 100 are recorded in the form of capture images with a predetermined time interval in view of recording capacity (recording time) of the image recording medium 105.

By performing step 308, image information for driving circumstances around the automobile 100 is recorded to the image recording medium 105 as digital information.

The digital information is stored to the image recording medium 105 after being compacted using a proper compaction program, whereby it is possible to cope with a limitation in recording time due to a limitation in recording capacity of the image recording medium 105.

The image signals recorded to the image recording medium 105 can be reproduced by the image reproducing device 200 mounted to the automobile 100 or by a separate reproducing device.

In the case that the image reproducing device 200 is mounted to the automobile 100, if it is determined at step 309 that images are to be reproduced (corresponding to instructions such as a reproduction key input by a user), the decoder section 201 implements a decoding operation which is a reverse process to the encoding operation and then implements a digital/analog conversion operation, thereby to reproduce digital image information. The image information reproduced by the decoder section 201 is displayed on the display section 202, as in step 311.

The display section 202 can be constituted by a VDT, an LCD, etc. In the case that the conversion operation by the encoder 104 is implemented to have an NTSC format, composite image signals are constructed using the NTSC format and then outputted, and the images obtained by the two first and second cameras 101 and 102 and screen-two-divisionally processed are displayed on one display section 202.

In the case that the image reproducing device is provided as a separate element, the image recording medium 105 is disconnected from the connector, the communication port or the like, and then, the image recording medium 105 is connected to the image reproducing device using a

connector, a communication port or the like, thereby to enable signal encoding and displaying.

In the case that the image reproducing device 200 is constituted by a PC having a capture board, it is possible to store images to be displayed in the form of a file after implementing a capture process and to print the images.

The device for recording an image of driving circumstances around an automobile as shown in FIGs. 1A through 3, of the present invention, represents a preferred embodiment of the present invention. By the present invention, a situation of an accident can be reproduced in a more realistic manner in that sound information obtained by microphones installed inside and outside the automobile can be recorded and reproduced together with the image information.

As described above, by the device for recording an image of driving circumstances around an automobile according to the present invention, advantages are provided in that since a real-time recording of images and sounds around the automobile is accomplished during running, parking or stopping, a situational evidence of a minor collision, a crash, etc. which occur in association with an automobile can be secured as image and sound information.

Further, in the device for recording an image of driving circumstances around an automobile according to the present invention, even if a battery power supply of the automobile is shut off due to the occurrence of an accident, because power is continuously supplied from an auxiliary power supply section to ensure continuity of an image recording operation, a situational evidence of the accident can be secured.

Moreover, in the device for recording an image of driving circumstances around an automobile according to the present invention, since images around the automobile can be recorded for many hours in the form of a capture image when the automobile is parked or stopped, a function of preventing a crime against the automobile is simultaneously achieved, whereby information such as not only a type of an offending automobile, but also a color and a license number of the offending automobile, facial features and clothes of an offender, etc. can be precisely secured as highly reliable information while not depending upon a witness.

In the drawings and specification, there have been disclosed typical preferred embodiments of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for

purposes of limitation, the scope of the invention being set forth in the following claims.

WHAT IS CLAIMED IS:

1. A device for recording an image of driving circumstances around an automobile, the device comprising:

a plurality of cameras mounted to the automobile for obtaining in real time the driving circumstances around the automobile as image information;

image signal processing means for processing the image information obtained by the plurality of cameras to a format which is suitable for recording and reproducing; and

image recording means for storing in real time the image signals processed by the image signal processing means.

2. The device as claimed in claim 1, wherein the device has at least two cameras; and the device further comprises screen-divisional processing means for divisionally recording and reproducing image information obtained by the at least two cameras, on a screen.

3. The device as claimed in claim 1, further comprising:

recording time interval adjusting means for adjusting a recording time interval of an image signal which is recorded to the image recording means.

4. The device as claimed in claim 1, further comprising:

impact sensing means for sensing impact applied to the automobile from the outside;

an auxiliary power supply section for supplying power when impact is sensed by the impact sensing means; and

and means for switching a power source from a main power supply section of the automobile itself to the auxiliary power supply section when impact is sensed by the impact sensing means, thereby forcibly driving the device for a predetermined time.

5. The device as claimed in claim 1, further comprising:

means for reproducing and displaying image signals recorded to the image recording means.

6. The device as claimed in claim 1, wherein, among the plurality of cameras mounted to the automobile, a first camera is installed to be directed from the front

toward the rear of the automobile, and a second camera is installed to be directed from the rear toward the front of the automobile.

7. The device as claimed in claim 1, wherein microphones are installed inside and outside the automobile, whereby it is possible to implement a sound recording operation as well as an image recording operation.

FIG. 1A

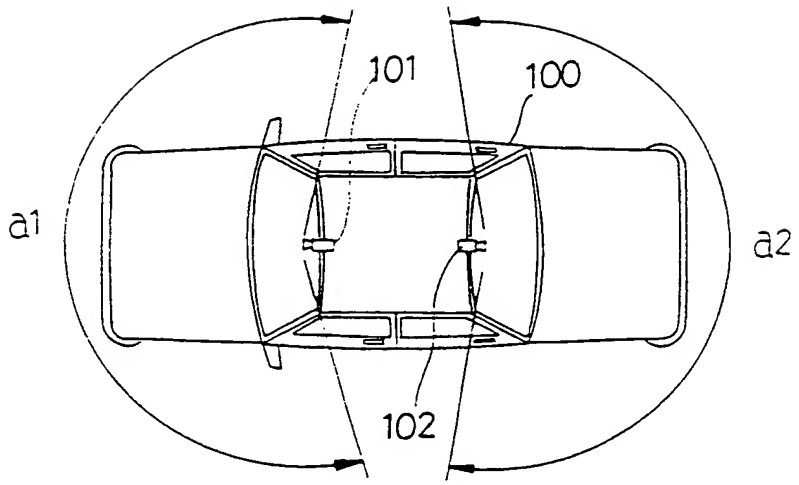


FIG. 1B

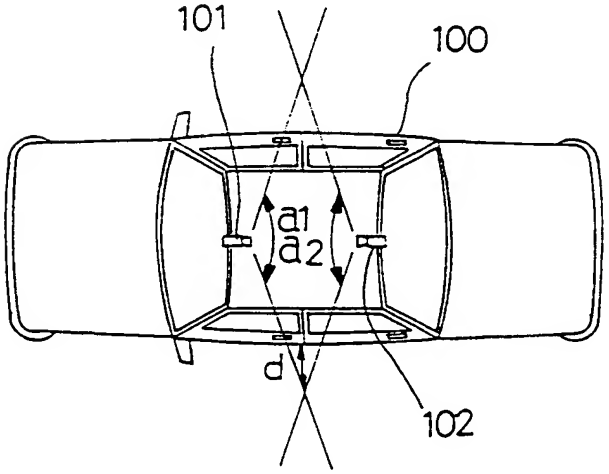


FIG. 2

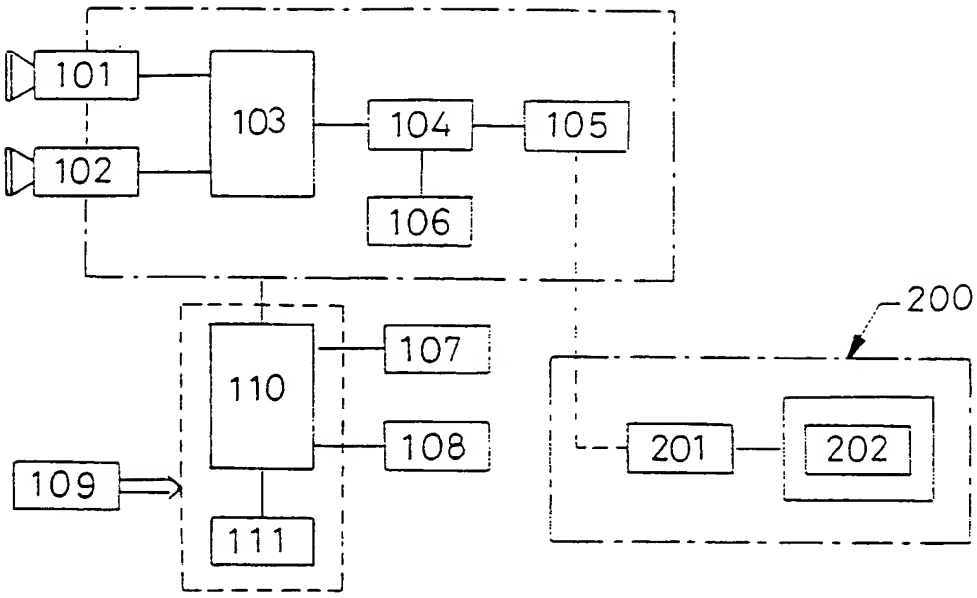
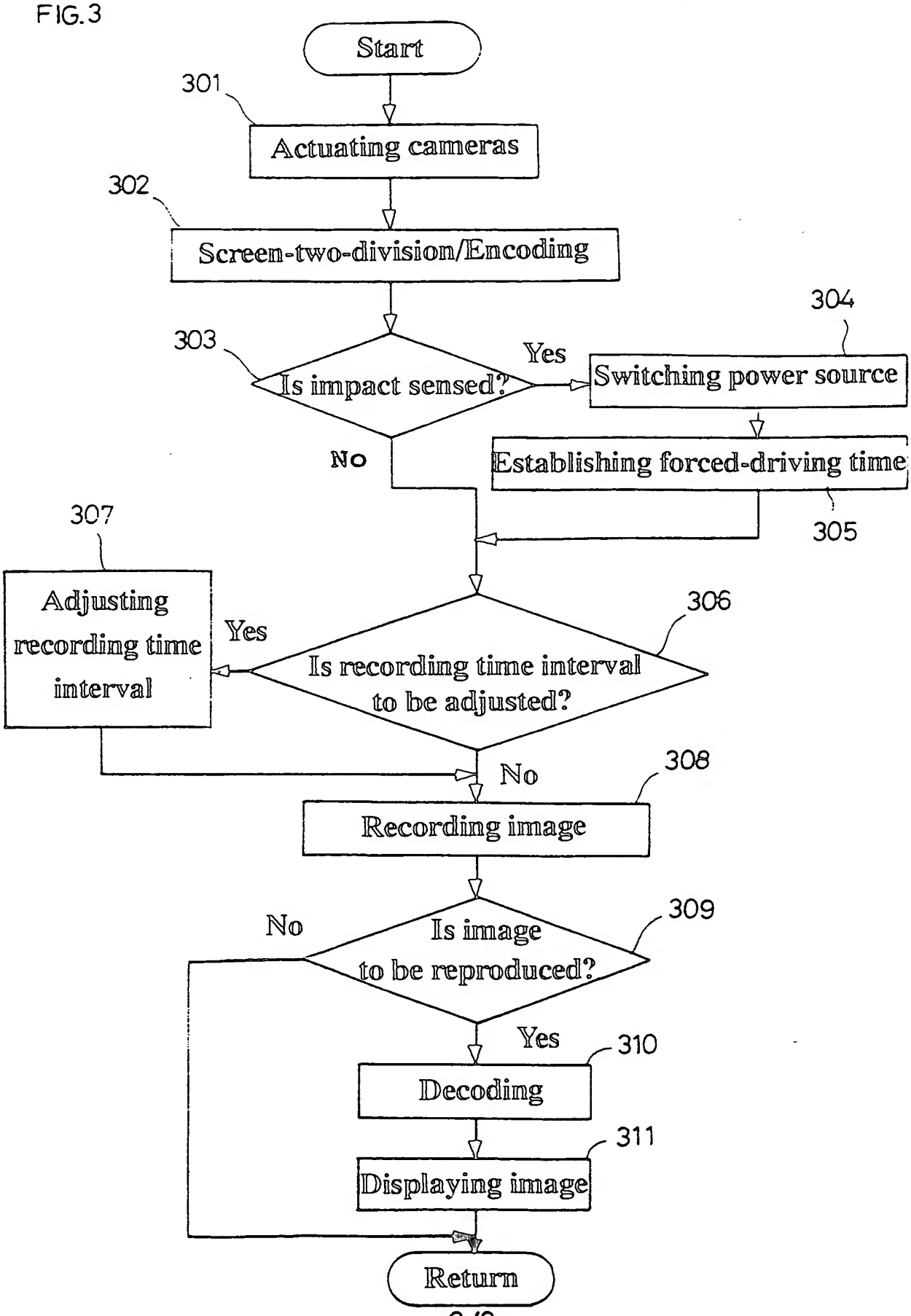


FIG.3


Start
301
Actuating cameras
302
Screen-two-division/Encoding
303
Is impact sensed?
Yes
304
Switching power source
Establishing forced-driving time
305
No
307
Adjusting recording time interval
Yes
306
Is recording time interval to be adjusted?
No
308
Recording image
309
No
Is image to be reproduced?
Yes
310
Decoding
311
Displaying image
Return

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 99/00505

CLASSIFICATION OF SUBJECT MATTER

IPC[7]: B 60 R 1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC[7]: B 60 R; B 60 Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5475494 A (NISHIDA et al.) 12 December 1995 (12.12.95) totality.	1
A	GB 2224358 A (LAWRENCE) 2 May 1990 (02.05.90) fig.1-3; abstract.	1,6
A	EP 0921375 A1 (MIXED REALITY SYSTEMS LABORATORY INC.) 9 June 1999 (09.06.99) totality.	1,2
A	DE 19700793 A1 (MACKERT) 16 July 1998 (16.07.98) abstract.	1

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
„A" document defining the general state of the art which is not considered to be of particular relevance
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„P" document published prior to the international filing date but later than the priority date claimed
„T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
„X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
„Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
„&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
4 May 2000 (04.05.2000)	7 August 2000 (07.08.2000)
Name and mailing adress of the ISA/AT Austrian Patent Office Kohlmarkt 8-10; A-1014 Vienna Facsimile No. 1/53424/535	Authorized officer Pangratz Telephone No. 1/53424/413

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR 99/00505

Patent document cited in search report			Publication date	Patent family member(s)			Publication date
DE	A1	19700793	16-07-1998			none	
EP	A1	921375	09-06-1999	JP	A2	11168756	22-06-1999
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